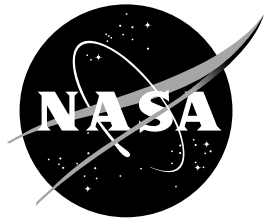


NASA Facts

National Aeronautics and
Space Administration

Goddard Space Flight Center

Greenbelt, Maryland 20771
(301) 286-8955



FS-2002-04-041-GSFC



Goddard Space Flight Center

Goddard's Vision Statement: We revolutionize knowledge of the Earth and the Universe through scientific discovery from space to enhance life on Earth.

HISTORY

NASA's Goddard Space Flight Center, established in 1959 and named after rocket research pioneer Dr. Robert H. Goddard, employs hundreds of premier scientists and engineers who are devoted to research in Earth science, space science, and technology.

The Center's fundamental mission is to expand our current knowledge of the Earth and its environment, the solar system, and the Universe through observations from space. To ensure our Nation maintains leadership in this endeavor, Goddard is committed to excellence in scientific research and investigation, the development of space systems and the advancement of essential technologies.

ORGANIZATION

Goddard is comprised of a system of directorates:

Office of the Director - Provides overall management, strategic planning, and integrating of the diversified activities of the Center. Included within this directorate are the Equal Opportunity Programs Office, the Office of Public Affairs, Office of Chief Counsel, and the Office of University Programs.

Office of Human Resources - Provides customer-focused services and innovative solutions that position Goddard to optimize its most valuable resource — its employees. Staff members provide services in the areas of recruitment, compensation, benefits (including family friendly leave/programs), training and development, change management, employee and labor relations and workforce planning. Their goal is to create and maintain a supportive work environment for all employees in order to achieve success in NASA's mission.

Office of the Chief Financial Officer - Plans and directs the development, implementation, oversight and administration of Goddard

system of resources management and financial control.

Management Operations Directorate - Provides program, infrastructure and institutional support to ensure the success of Goddard's missions. In addition to supplying traditional institutional supplies and services and maintaining the Center's infrastructure, the directorate plays a key role in the evolution of the Center's project management, its scientific and technological activities, and oversees safety, environmental and security issues.

Office of Systems Safety and Mission Assurance - Has broad responsibility and general authority for reviewing technical and flight safety aspects of Goddard projects, spacecraft systems, launch vehicle systems, operational ground systems and scientific instruments for both satellites and Shuttle payloads.

The office assures mission success and reliability by performing independent design reviews of technical and flight safety aspects of all spacecraft and instruments, as well as supporting systems, and safety and mission assurance throughout the entire program life cycle of Goddard's missions.

Operating within this directorate is the Independent Verification and Validation Facility, located in Fairmont, W.V., which was established in 1993 as part of an agency-wide strategy to provide the highest achievable level of safety and cost-effectiveness for mission critical software.

Flight Programs and Projects Directorate - Manages and implements Goddard's flight programs and projects. Performs mission design, fabrication, integration and test, qualification, readiness review management, launch and orbital operations, contract management, and technical and business management.

Primary responsibilities include the Hubble Space Telescope and Next Generation Space Telescope, Geostationary and Polar Operational Satellites, Living with a Star and Solar Terrestrial Probes, the Earth Observing System, Explorers and Earth Explorers, Structure and Evolution of the Universe missions, and a portion of the New Millennium Program. The directorate also oversees development and operation of the Tracking and Data Relay Satellites, and Space and Ground Networks.

The Earth Science Data and Information System (ESDIS) Project provides scientists and other users access to NASA's Earth Science Enterprise mission data via the Earth Observing System Data and Information System (EOSDIS). EOSDIS commands and controls NASA's Earth Observing System satellites and instruments, generates useful products from orbital observations and supports the generation of data sets from satellite observations into global climate models.

Currently, EOSDIS manages and distributes data from several NASA missions including Landsat-7, QuikSCAT, Terra and ACRIMSAT, UARS, SeaWiFS, TOMS-EP, TOPEX/Poseidon and TRMM.

Applied Engineering and Technology Directorate - Provides engineering expertise for end-to-end conceptualization, development and use of Earth and space science missions, including the delivery of science products. The directorate also provides expertise in information systems; electrical systems; mechanical systems; guidance, navigation and control; and instrument technology.

Space Sciences Directorate - Seeks to expand scientific knowledge by way of observational and theoretical research relating to the Solar System, our galaxy and the Universe. The directorate performs this work in partnership with both national and international scientific communities.

Programs range from basic research, to flight experiment development, to mission operations and data analysis.

NASA's space science missions are grouped into four major themes, with Goddard having responsibility for two:

*The Sun-Earth Connection, which investigates the Sun and how it changes, affecting the Earth (including effects on life and society) and other bodies in the solar system; and

*The Structure and Evolution of the Universe, which seeks to explain structure in the Universe and forecast our cosmic destiny, explores cycles of matter and energy in space, and examines the ultimate limits of gravity and energy from the closest stars to the most distant quasars.

Goddard manages about two dozen Sun-Earth Connection and Structure and Evolution of the Universe missions currently in operation, including the Advanced Composition Explorer and the Microwave Anisotropy Probe.

Living With a Star is one of NASA's largest Sun-Earth Connection endeavors. The program focuses on 'space weather' - Sun-oriented disturbances in interplanetary space that often affect the Earth. Understanding space weather and its effects allows us to predict the impacts of solar variability on humans, technological systems and even the presence of life.

This Goddard-managed program includes scientific missions in space, theory, modeling and data analysis activities, as well as a space environment testbed program.

Cosmic Journeys, a new series of space missions under NASA's Structure and Evolution of the Universe theme, explores the essence of time, gravity, matter and energy.

Cosmic Journey missions will take us to

where space and time cease to exist as we know them, and to where secrets of the past and future lie hidden in the light received across the expanse of the Universe. Using the Universe as a laboratory, NASA will probe some of the most extreme environments that have ever existed.

'Where do we come from, and are we alone?' are two defining questions centering around NASA's Origins Program. The Hubble Space Telescope is an integral part of the Origins Program. By using its excellent pointing precision, powerful optics, and state-of-the-art instruments, Hubble provides scientists and novices alike with stunning views of the Universe that cannot be captured using ground-based telescopes or other satellites.

For more than a decade, Hubble has maintained a standard of excellence in exploring the development of space and human enterprise, researching and developing advanced technologies and advancing and communicating scientific knowledge. Thanks to its visionary, modular design, which allows NASA astronauts to take it apart, replace worn out equipment and upgrade its instruments, Hubble continues to produce first-class science using cutting-edge technology.

Three laboratories - described below in order of high energy to low energy research - along with the Space Science Data Operations Office, operate within the Space Sciences Directorate.

The Laboratory for High Energy Astrophysics is recognized world wide as a center of excellence and leadership in cosmic ray, X-ray and gamma ray astrophysics. Scientists work with engineers and technicians to pioneer state-of-the-art instruments, which yield breakthrough discoveries. The laboratory is currently building the Swift mission to determine the nature of gamma ray bursts, considered the largest explosions in space since the Big Bang. The

laboratory also is building next-generation X-ray and gamma-ray detectors for future NASA missions.

A Gravitational Wave Astrophysics group, recently established in the Laboratory for High Energy Astrophysics, focuses the work of experts on theory and engineering to develop gravitational wave detectors and ultimately space-based missions to measure gravitational waves. Predicted by Einstein, such waves have never been directly detected, and supposedly travel at light speed, penetrating the entire Universe without interference from dust or gas in space.

The Laboratory for Astronomy and Solar Physics conceives and implements research projects in ultraviolet and optical space astronomy, as well as studies from space of infrared, submillimeter, and radio waves. The laboratory also conducts solar physics missions and research programs. Currently operating programs include the Hubble Space Telescope, which bears the laboratory's Space Telescope Imaging Spectrograph, an instrument that performed the most important census of giant black holes in galaxies. The laboratory-built Microwave Anisotropy Probe also is operating as the first artificial satellite in orbit at the L2 point, a location about one million miles from Earth in the direction opposite the Sun.

Laboratory personnel also have leadership roles in developing NASA's future Next Generation Space Telescope and in operating the European Space Agency/NASA Solar and Heliospheric Observatory, orbiting at the L1 point, about one million miles sunward of the Earth.

Scientists in the laboratory, with other Goddard and university-based colleagues, conduct an active program of instrument and technology development for interferometry, a method of obtaining very high spatial resolution in future space telescope missions.

The Laboratory for Extraterrestrial Physics advances our understanding of the physics and chemistry of the solar system, the Earth's magnetospheric environment, including subatomic particles, plasmas, waves, and electric and magnetic fields, and similar properties of interplanetary space and the environments of planets beyond Earth. Laboratory scientists include leaders in magnetometry, which is the precision measurement of weak magnetic fields in space, who have made major discoveries in this field, including important contributions to understanding the ancient environment of Mars and its suitability for the existence of life. Research on comets focuses on such fundamental questions as whether they may have contributed much of the early water here on Earth.

A Community Coordinated Modeling Center, operated within the Laboratory for Extraterrestrial Physics, concentrates the efforts of NASA and various Defense and civil agencies on developing the best ways to model, understand and forecast space weather and its effects on the Earth's environment.

Experts in the infrared spectroscopy develop new instruments, search for direct evidence of planets around stars beyond the Sun, and map the wind fields on outer solar system bodies by remote sensing from Earth. Other personnel operate instruments on NASA planetary probes that explore these bodies from close by.

The Space Data Operations Office in the Space Sciences Directorate focuses on improved methods of data archiving, retrieval and modeling, providing a wide variety of services to the scientific community worldwide. Much of this work is done through the National Space Science Data Center, which archives measurements and images from numerous NASA missions, serving the public as well as scientists. Information technology and security are other important functions of the Space Data Operations Office.

Suborbital and Special Orbital Projects

Directorate - physically located at Goddard's Wallops Flight Facility, Wallops Island, Va., this directorate manages NASA's Sounding Rocket and Scientific Balloon Programs, the Shuttle Small Payloads Projects, NASA University Class Projects, an International Space Station Research Program and science aircraft. It conducts a variety of scientific and technology research at its test range, which includes tracking and data acquisition systems, a research airport and rocket launch facilities. Research conducted by the directorate supports NASA, Department of Defense, other government agencies, and various commercial organizations.

Earth Sciences Directorate - Plans, organizes and evaluates a broad program of scientific research in the Earth sciences, ranging from basic research to flight experiment development, to mission operations and data analysis.

NASA's Earth Science Enterprise seeks to transform raw data from various Earth-observing missions into new scientific knowledge. To this end, the Earth Sciences Directorate conducts missions that obtain highly accurate and frequent measurements of the Earth, as well as advanced computer networks that transmit data and the resulting information to a wide variety of global users.

Three laboratories operate with the Earth Sciences Directorate:

The Laboratory for Atmospheres advances our knowledge and understanding of the Earth's atmospheres, as well as those of other planets. The laboratory conducts a broad theoretical and experimental research program studying the structural, dynamic, radiative, and chemical properties of atmospheres, with extensive use of space, airborne and surface observations.

The Laboratory for Terrestrial Physics advances the knowledge of Earth and planetary

science through innovative research using space technology. Scientific investigations include studying the internal structure, dynamics and material variations of the solid Earth and planets. Biospheric interactions and global change research enhances our ability to understand the effects of climate change on ecosystems and the effects of land surface vegetation change on the climate.

Collaborative efforts among the Goddard directorates leads to the design, building and demonstration of state-of-the-art scientific instruments for Earth and planetary remote-sensing observational science programs.

The laboratory is involved in projects such as the Mars Orbiter Laser Altimeter, the Satellite Laser Ranging System, the Moderate Resolution Imaging Spectroradiometer and the Landsat missions.

The Earth and Space Data Computing Division manages and operates a world class super computing and data center, making NASA science data more accessible to both researchers and novices around the globe. More than 1,000 U.S. scientists use Goddard's super computers to develop Earth system models for mathematical abstractions of processes and assimilations of observational data.

The division has networks and transparent interfaces, providing scientists with direct access to our visualization tools, of which the results are then displayed at each of their remote locations. The data provides NASA-supported scientists with increased understanding of the Earth, our solar system and Universe through computational modeling and processing of these space-borne observations.

The Laboratory for Hydrospheric Processes is an important resource for observing, understanding and modeling the global oceans and related research in the marine bio-geochemical, cryospheric and hydrologic processes.

Research activities at this laboratory focus on the links between all aspects of the water cycle, as well as global weather and climate.

Scientists develop and apply microwave and multi-spectral optical remote sensing to measure and define the abundance of water, ice and snow on land surfaces, oceanic salinity, precipitation, the exchange of water between soil, biosphere, and atmosphere, and to measure oceanic biological productivity.

The laboratory is a major participant in ongoing projects involving data from TOPEX, which provides information about the changing topography of the world's oceans, the Sea-viewing Wide Field of View Sensor, which looks at our planet from space to better understand it as a biological system, and the Tropical Rainfall Measurement Mission, which increases our understanding of the water cycle in the current climate system.

Goddard's Earth Science and Public Health Program enables use of and timely access to NASA's science expertise, data and technologies to address priority health issues.

The program promotes improved understanding of the links between the environment, weather and climate with public health problems such as infections and vector-borne diseases, urban, regional and global air and water pollution, heat stress, ultraviolet radiation, air and waterborne diseases and contaminant transport and deposition.

By using NASA's unique vantage point in space, improved computational capabilities, geographic information systems and interdisciplinary research approach, scientists can observe, measure, monitor and predict environment-related public health problems.

Current research projects include work on Rift Valley Fever, asthma, malaria, filariasis, meningitis, West Nile Virus, African dust, air pol-

lution, urban heat islands, Ebola, and St. Louis Encephalitis.

The Goddard Institute for Space Studies is a division of Goddard's Earth Sciences Directorate. Located at Columbia University in New York City, N.Y., researchers at the Institute focus on the prediction of atmospheric and climate changes. This interdisciplinary research initiative studies natural and man-made changes in our environment, which occur on various time scales (from the seasonal effects of volcanic explosions to the millennia of ice ages) and which can affect the physical environment of our planet.

The Global Change Data Center at Goddard develops and operates data systems, generates science data products, and provides archival, distribution and information management services to maximize Goddard's Earth science data.

Rapid access to Earth science data from satellites and ground validation stations is vital to our Nation's efforts in understanding the effects of global environmental change. Data and information management challenges continue to grow as data volume increases from current levels measured in gigabytes per day to planned levels in the terabyte per day range.

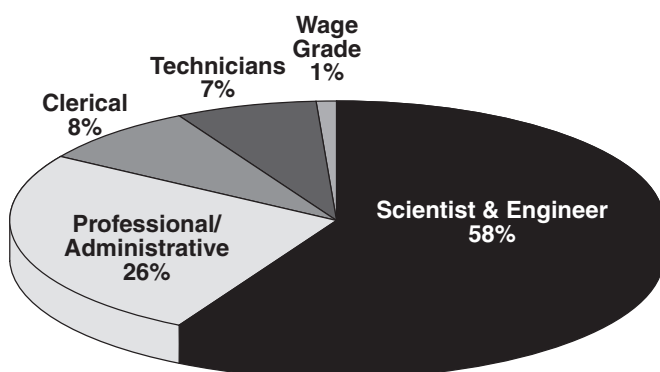
To help meet this challenge, the Global Change Data Center is using advanced information technologies for data access and storage, network throughput, processing power and database/information management.

GODDARD'S WORKFORCE

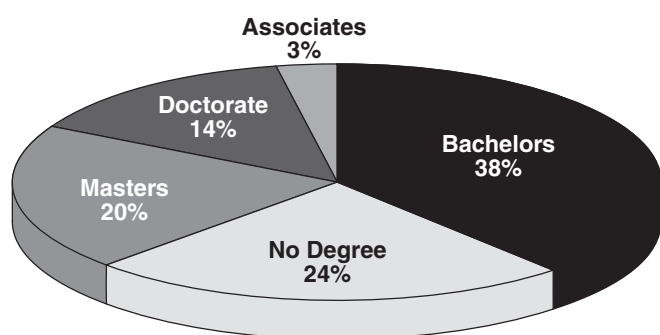
Goddard Space Flight Center employs a total of about 9,006 civil servants and contractors. Employees work either at the Goddard campus in Greenbelt, Md., Wallops Flight Facility in Wallops Island, Va, the Goddard Institute for Space Science in New York City,

the IV&V Facility in Fairmont, W.V., and White Sands Complex, near Las Cruces, N.M.

Full-time Permanent Civil Servants by Skill October 2001



Full-time Permanent Civil Servants by Degree/October 2001



GODDARD'S BUDGET

For Fiscal Year 2001, Goddard received \$2,770.7 million. Of this amount, approximately \$863 million was appropriated for space science and another \$883 million was appropriated for Earth science efforts. Goddard applied the remaining \$1,024.7 million to research and program management, human exploration and development and space, reimbursables and other programs.

ADVANCING TECHNOLOGY

To continue NASA's discoveries of the

Universe and our near-Earth environment, Goddard's future missions will feature spacecraft that are smaller, lighter and less costly to launch and operate than those of past generations.

Goddard scientists and engineers are already designing more sensitive science instrument detectors, and navigation-related systems that will allow tiny satellites to fly in precise formation with each other, allowing joint observations of the Sun and distant stellar objects.

The Nanosat Constellation Trailblazer (or Space Technology-5) mission is the fourth deep space mission in NASA's New Millennium Program. Space Technology-5 will fly three miniature spacecraft - each about the size of a birthday cake - high above the Earth. NASA will use the trio of spacecraft to test methods for operating a constellation of spacecraft as a single system, and also test eight innovative new technologies in the harsh space environment near the boundary of Earth's protective magnetic field, known as the magnetosphere.

TECHNOLOGY TRANSFER

The Center's Technology Commercialization Office introduces Goddard technologies, capabilities and facilities into the commercial, academic and government communities. The primary way Goddard researchers participate in the technology transfer process is by identifying, documenting and reporting their new technologies to the Technology Transfer Commercialization Office, which maintains a current inventory of reported technologies.

Goddard's Technology Commercialization Office, as with all tech-transfer programs throughout the agency, is committed to finding new ways to apply space-based technology research to improve the quality of life here on Earth. Since the program's inception, NASA has continued to perform on its commitment to

outreach to U.S. companies, universities and other government agencies for joint research and development and application of NASA technologies through technology commercialization.

Recently, discussions between Finn Halvorsen, Program Director for Long Track Speedskating, and a representative from Goddard's Technology Commercialization Office resulted in a list of several possible NASA Technology Transfer opportunities. Due to time constraints, efforts were focused on adapting NASA's patented technique for super-polishing aluminum mirrors to "sharpen" the athlete's steel skates to a much smoother finish.

The inventor of NASA's technology for super-polishing aluminum mirrors was brought in to examine the possibility of polishing the steel skate blades. A process and fixture for polishing the blades was developed that is portable and only takes about 60 seconds to perform following the pre-sharpening of the blades by conventional techniques, resulting in a 15% increase in the skate's unassisted glide, an unprecedented performance by the U.S. Speedskating Team at the 2002 Winter Olympics, and the formation of a new company for the inventor.

COOL GODDARD WEBSITES

Goddard creates and maintains numerous web sites, which are an excellent source of information about our missions and programs. Below is a sample of what this Center has to offer:

Goddard Home Page:
<http://www.gsfc.nasa.gov>

New Millennium Program:
http://nmp.jpl.nasa.gov/index_flash.html

Hubble Space Telescope
<http://hubble.gsfc.nasa.gov/>

Next Generation Space Telescope:
<http://ngst.gsfc.nasa.gov/>

Scientific Visualization Studio:
<http://svs.gsfc.nasa.gov>

Earth Observatory:
<http://earthobservatory.nasa.gov/>

Visible Earth:
<http://visibleearth.nasa.gov/>

Remote Sensing Visualization:
<http://rsd.gsfc.nasa.gov/rsd/>

Imagine the Universe:
<http://imagine.gsfc.nasa.gov>

Starchild: <http://starchild.gsfc.nasa.gov/>

NASA Sun-Earth Education Forum:
<http://sunearth.gsfc.nasa.gov>

IMAGE/Poetry: <http://image.gsfc.nasa.gov/poetry/poetry.html>

Universe! Education Forum:
<http://helios.gsfc.nasa.gov/>

Structure and Evolution of the Universe:
<http://universe.gsfc.nasa.gov/>

Sun-Earth Connection:
<http://sec.gsfc.nasa.gov/>

Tracking and Data Relay Satellite System:
<http://nmisp.gsfc.nasa.gov/tdrss/tdrsshome.html>

General Public Inquiries

Need more information about Goddard missions or spacecraft, or special events and programs for the Goddard community, including speakers' bureau and exhibit loans? Send a letter to:

NASA's Goddard Space Flight Center,
Office of Public Affairs, Code 130
Greenbelt, MD 20771

Or call (301) 286-8955 (voice phone or TDD). For Wallops, call (757) 824-1579.

Education Programs

For classroom materials and information regarding programs for students and teachers, call (301) 286-7205. To reach the Goddard/Greenbelt Educator Resource Center for informational materials and appointments, call (301) 286-8570 or TDD (301) 286-8103; for Wallops call (757) 824-1776.

Visitor Center Information

The Goddard Visitor Center is currently open to educational groups. Call 301-286-8981 or TDD 301-286-8103 to schedule a visit.

The Wallops Visitor Center is open to the public, call 757-824-1344 to schedule a visit.

Business Opportunities

For information about Goddard Space Flight Center procurements call (301) 286-7522, or fax (301) 286-1706. For general information about Goddard's grants and cooperative agreements, call (301) 286-8511. Or, visit their Web site at: http://gsfc-aphrodite.gsfc.nasa.gov/200/mainpage/mod_main.html

Small Business Assistance

The Industry Assistance Section provides documents to aid in marketing and counseling. Call 301-286-6574/6575 for information. Information regarding the Small Business Innovation Research Program is available at 301-286-5810. Or, visit their Web site at: <http://www.sba.gov/sbir/indexsbir-sttr.html>